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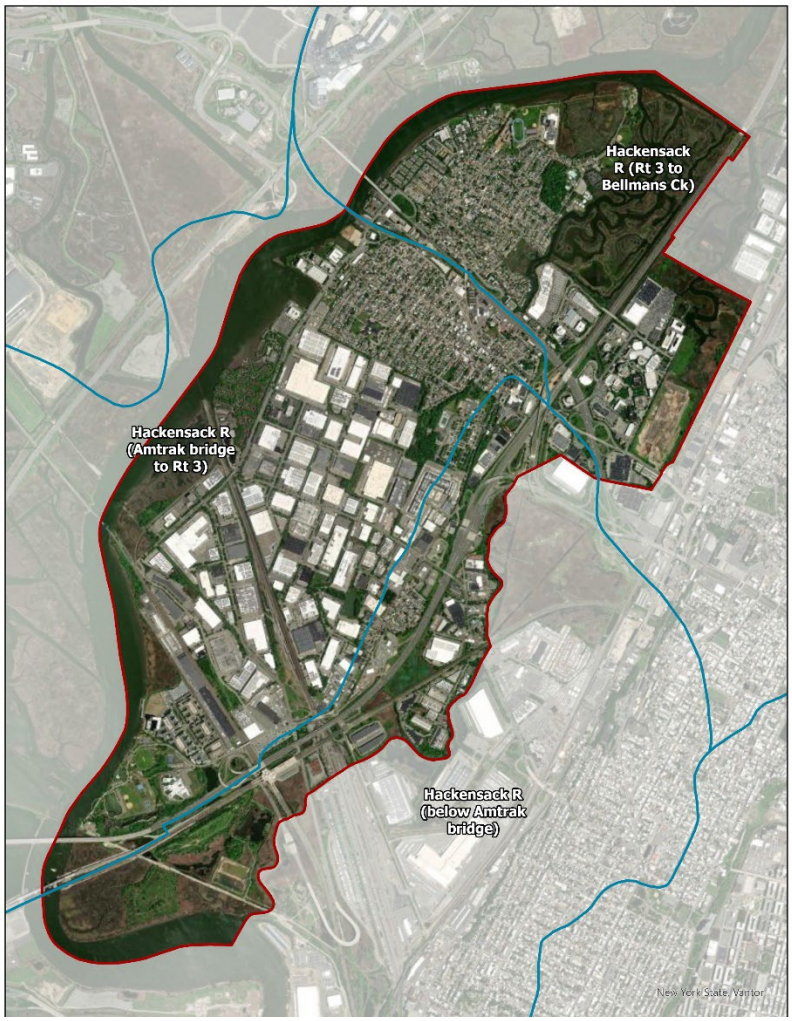

Town of Secaucus (Hudson County)

Watershed Inventory Report

Developed by the Rutgers Cooperative Extension Water Resources Program
Funded by New Jersey Department of Environmental Protection
October 20, 2026

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Acknowledgements

The Secaucus Town (Hudson County) Watershed Inventory Report has been produced by the **Rutgers Cooperative Extension (RCE) Water Resources Program**.

Funding for this project was generously provided by the **New Jersey Department of Environmental Protection** Contract WPR25-006.

Introduction

Located in Hudson County in northeast New Jersey, the Town of Secaucus covers over 4,197 acres. With a population of 22,181 (2020 United States Census), Secaucus's demographic is 43.8% white, 4.7% black or African American, 0.3% American Indian and Alaska Native, 32.5% Asian, and 18.7% other. The Hispanic population also includes 21.2% of the demographic.

The Town of Secaucus is dominated by urban land uses, which account for 64.4% of the municipality. Natural (forest, wetlands, water) land uses make up 34.2% of the municipality and barren land uses make up 1.3% of the municipality. There are no agricultural land uses in Secaucus. The urban land use is predominantly comprised of industrial uses at 29.8%. Residential land uses comprise 21.6% of the urban land uses in Secaucus with the majority being high density residential or multiple dwellings at 19.8% (NJDEP Open Data). The New Jersey Department of Environmental Protection (NJDEP) defines multiple dwelling and high-density residential development as single-unit residential areas with more than five dwellings per acre; neighborhoods of two- or three-family homes, row houses, and garden apartments up to three stories; and larger complexes such as condominiums, apartment buildings, and towers of four stories or more (Anderson et al., 1976).

Secaucus contains portions of three subwatersheds which can be seen in Table 1. The total area of the subwatershed and the portion that is within Secaucus are included in the table. There are approximately 33 miles of rivers and streams within the municipality; these include Cromakill Creek and its tributaries, the Hackensack River and its tributaries, Mill Creek and its tributaries, Penhorn Creek and its tributaries, and several uncoded tributaries. Secaucus is within the New Jersey Department of Environmental Protection (NJDEP) Watershed Management Area (WMA) 5 (Hackensack, Hudson, and Pascack).

Table 1: Town of Secaucus Subwatershed Areas

HUC 14	Subwatershed Name	Municipality Area (acres)	Total Area (acres)
02030103180080	Hackensack R (Rt 3 to Bellmans Ck)	1,229	5,080
02030103180090	Hackensack R (Amtrak bridge to Rt 3)	2,046	6,370
02030103180100	Hackensack R (below Amtrak bridge)	922	6,814
Total		**4,197**	**18,264**

The purpose of this watershed inventory report is to provide a comprehensive understanding of key, defining features within the watersheds throughout Secaucus. This involves gathering, organizing, and presenting information about existing conditions and infrastructure within each watershed. It aims to serve as a tool for informed decision-making, planning, and implementation of sustainable watershed management strategies aimed to protect and enhance the health of the watershed, its associated ecosystems, and the surrounding communities. This will allow existing water quality issues (TMDLs and water quality impairments) to be addressed. Known flooding areas can also be addressed through this process. Known areas of repetitive flooding include Kolle Boulevard, Golden Ave, Born Street, Humboldt Street, Grace Ave, Plaza Center, and Patterson Plank Road.

A geographic information system (GIS) was used to visualize data pertaining to the existing stormwater infrastructure, land cover, watershed delineation, and water quality classification and impairments within separate layers. Datasets from the New Jersey Department of Environmental Protection's (NJDEP's) GIS database was used to populate the watershed inventory map, from which the relevant data were isolated. Datasets representing Secaucus's existing stormwater infrastructure were provided by the municipality and were manipulated, if necessary, for the specific purposes of this report. All data layers can be viewed in greater detail at the following webmap: https://go.rutgers.edu/7v9s7xcn

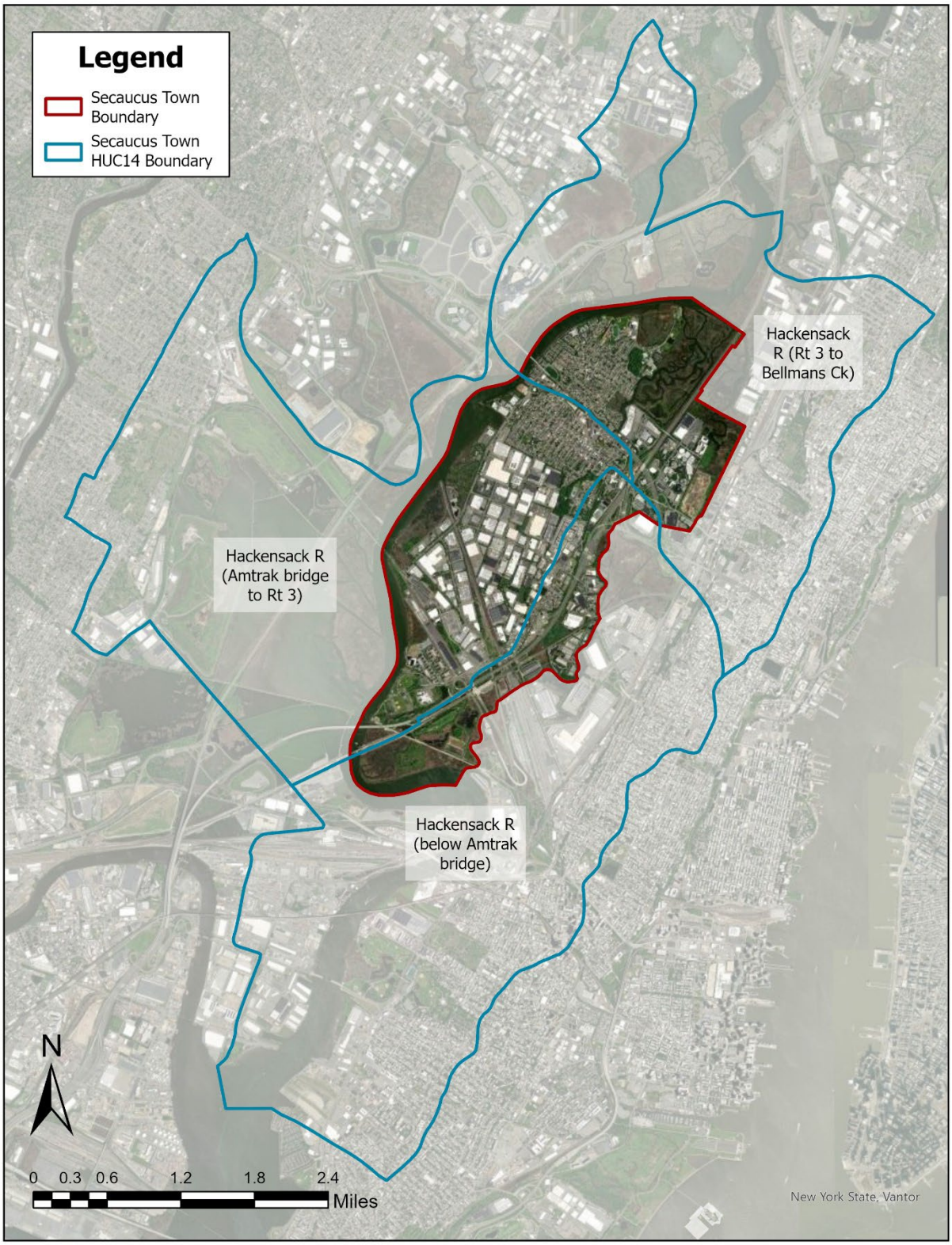

Figure 1: Town of Secaucus Subwatersheds (HUC14s)

Stormwater Outfalls

Secaucus owns and operates 62 stormwater outfalls that drain directly into waterways as of August 2026. Figure 2 depicts the outfalls that are owned and operated by Secaucus per the MS4 permit from the NJDEP.

All outfalls that are "owned and operated" by Secaucus are required to be inspected once every five years per the MS4 permit from the NJDEP for erosion and illicit discharges.

Receiving Surface Waters

Table 2 shows how many outfalls are in each Receiving Surface Water based on the "Surface Water Quality Classification of New Jersey" layer and the "Waterbody 2020 in New Jersey" based on the National Hydrography Dataset (NHD) accessed in August 2026. Figure 2 indicates the receiving waterbodies of the Secaucus owned and operated outfalls.

Table 2: Town of Secaucus Receiving Surface Waters and Outfall Percentage

Receiving Surface Water	Outfall Number	Percent
Cromakill Creek	2	3.2%
Hackensack River	4	6.5%
Hackensack River Tributary	24	38.7%
Mill Creek	9	14.5%
Mill Creek Tributary	3	4.8%
Penhorn Creek	2	3.2%
Penhorn Creek Tributary	6	9.7%
Uncoded Tributary	12	19.4%

Water Quality Classification

The majority of streams in Secaucus are classified as FW2-NT/SE2 based on the "Surface Water Quality Classification of New Jersey" layer accessed in August 2026. About 26.2 miles, or 80.7%, of streams in Secaucus are considered FW2-NT/SE2. About 6.3 miles, or 19.3%, of the streams in the municipality are considered SE2. The number of outfalls discharging to each surface water quality designation can be seen in Table 3. Figure 2 also depicts the water quality classification of surface waters throughout Secaucus.

Table 3: Town of Secaucus Receiving Surface Water Quality and Outfall Percentage

Receiving Surface Water Quality	Outfall Number	Percent
FW2-NT/SE2	58	93.5%
SE2	4	6.5%

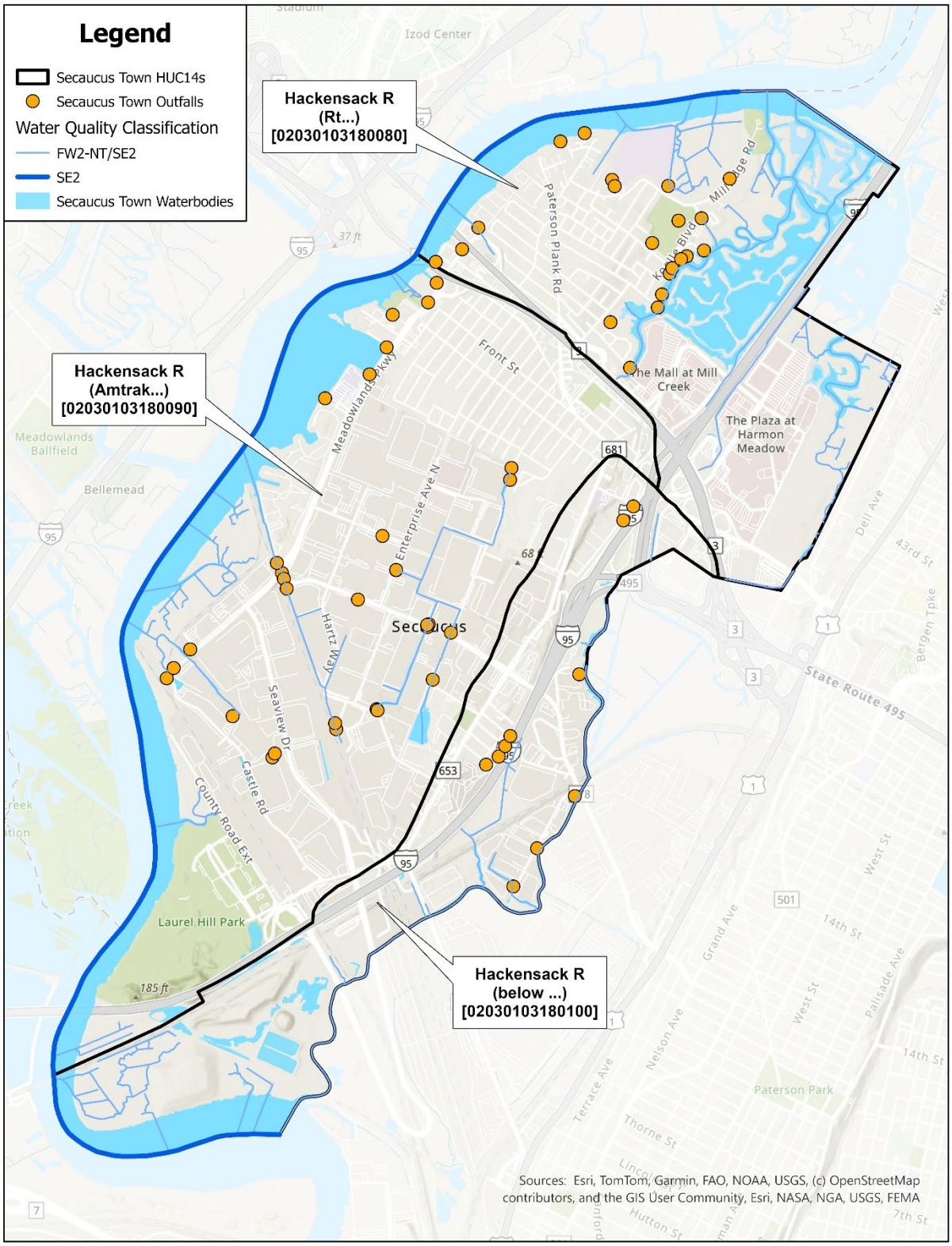

Figure 2: Town of Secaucus owned and operated stormwater outfalls

Stormwater Interconnections

Secaucus contains parts of other MS4 systems including state owned (New Jersey Department of Transportation (NJDOT)) and county owned (Hudson County) systems. The locations of these stormwater interconnections have been delineated as a series of point locations that mark where one system enters or leaves from another. Every effort was made to correctly represent interconnection with available data of roads and parcels along with the stormwater piping network. Due to the complexity of the stormwater piping system, there are many instances where water moves back and forth between systems, and it is often unclear exactly which portions are owned or maintained by which entity. There is a total of 123 interconnections delineated with the parties involved being Hudson County, the NJDOT, private, or the school district. Of those, 47 interconnections are flowing from Secaucus into another entity, and 76 are flowing from another entity into Secaucus. Figure 3 illustrates the distribution of these interconnections.

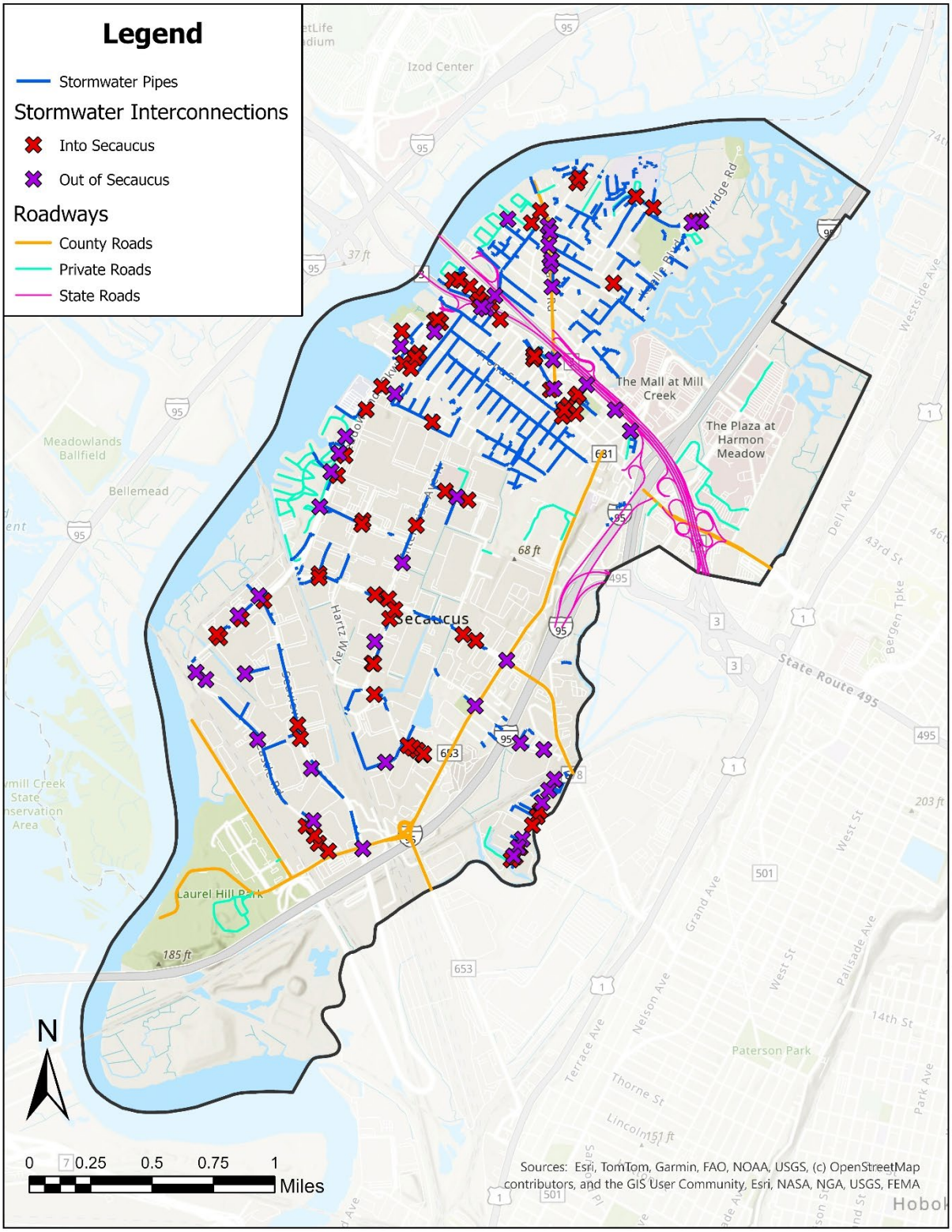

Figure 3: Town of Secaucus stormwater interconnections

Drainage Area Delineations

The Watershed Inventory Report includes a delineation of the drainage areas that are flowing to outfalls as well as upstream of interconnection points that flow out Secaucus's MS4 system and into another MS4 system. These delineations can identify potential sources for illicit discharges from outfalls or aid in identifying other issues in the stormwater piping network.

General Methodology

The procedure used to delineate drainage areas for the outfalls and interconnection points considered the municipality's topography, the stream network, and the pipe network using toolsets in ArcGIS Pro and ArcHydro. This stormwater representation combines surface drainage and connectivity defined by the stormwater infrastructure which redirects the surface drainage. The outfalls and interconnection points represent drainage points for drainage area delineation purposes. Since the datasets mapping the pipe network and these drainage points may have been established independently of one another, it was important to establish connectivity within the network. Thus, the closest point along a pipe to these drainage points was found. For the interconnections, these points were adjusted where needed to ensure they were placed along the stormwater pipe network. In the case of the outfalls, these points were connected via new lines representing the connection from the stormwater pipe network to the outfalls. The same procedure was then used to establish connectivity between the outfalls and the nearest stream or waterbody.

Once connectivity was established, these networks were used to alter the existing topography by reconditioning the digital elevation model (DEM) to represent this network as an artificial low point in the elevations. The purpose of this is to direct surface flow to the stormwater pipe network and into the streams. Further processing must be employed to generate a hydraulically correct DEM by filling local low points that would otherwise disrupt further hydraulic analysis.

Using this modified DEM, analysis tools constructed rasterized flow direction and flow accumulation data. Ideally, the flow accumulation would coincide with the pipe and stream network. However, the necessary measures for DEM preprocessing and reconditioning introduce some error to the analysis, so these layers are not entirely in agreement. As the drainage points must be located along the flow accumulation network, the closest point along the flow accumulation line was found for each of the outfalls and the interconnections. Then, a watershed

delineation tool was used, which took the flow direction into account along with each of the drainage points to delineate each respective drainage area.

Visual analysis was performed to ensure that the delineated drainage areas were adequate representations of the surface flow into the pipe network that fed into each drainage area. Delineations that were insufficient representations for their associated outfall or interconnection were adjusted and corrected where possible to ensure accurate representation of the drainage area based on the available datasets.

The delineation procedure is not entirely accurate due to assumptions and analysis issues and is ineffective if there is not a well-established pipe network, but it does provide a rough understanding of what the drainage areas sources are for outfalls and interconnections. Future procedures can be refined to improve the delineation process by incorporating networks and catch basins into the analysis. This effort should be combined with auditing and refining the stormwater pipe network to fill in gaps.

Outfalls

The delineated watersheds representing the drainage area of the outfalls are referred to as "outfallsheds" moving forward. The watershed delineation tool generated a total of 62 outfallsheds, meaning that delineation successfully delineated a drainage area for each outfall. The 62 unique outfallsheds displayed in Figure 4 were reviewed and revised as necessary to be appropriate representation of the surface runoff that drained to the pipe network associated with each of these outfalls. To look at these drainage delineations in more proper detail, please refer to the webmap: https://go.rutgers.edu/7v9s7xcn

Interconnections

The watershed delineation tool generated a drainage area for each of the 47 stormwater interconnections flowing out of the municipality into another entity. The 47 unique drainage areas representing the surface runoff that drains to the pipe network associated with the drainage point at each interconnection are displayed in Figure 5.

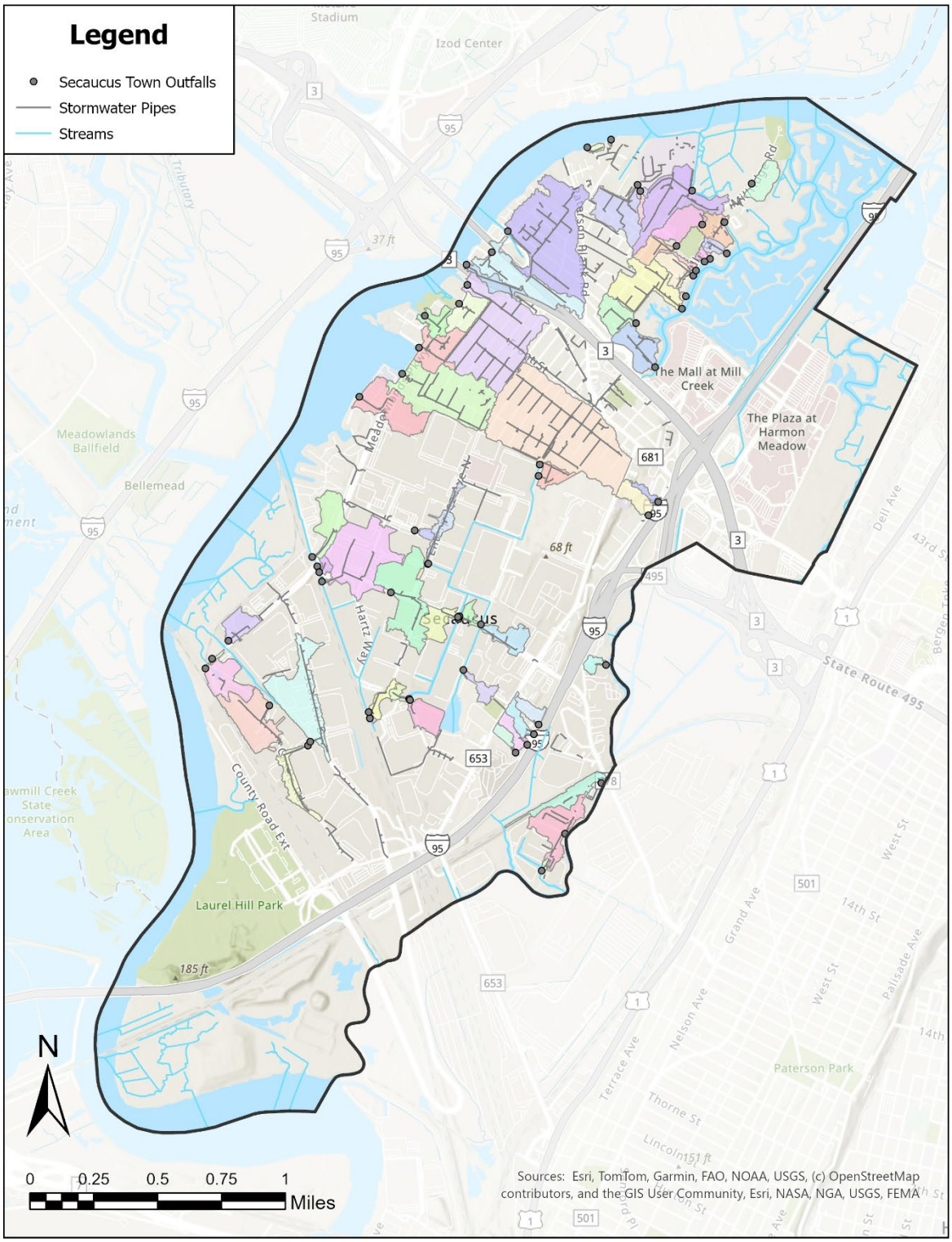

Figure 4: Town of Secaucus outfall watershed delineations

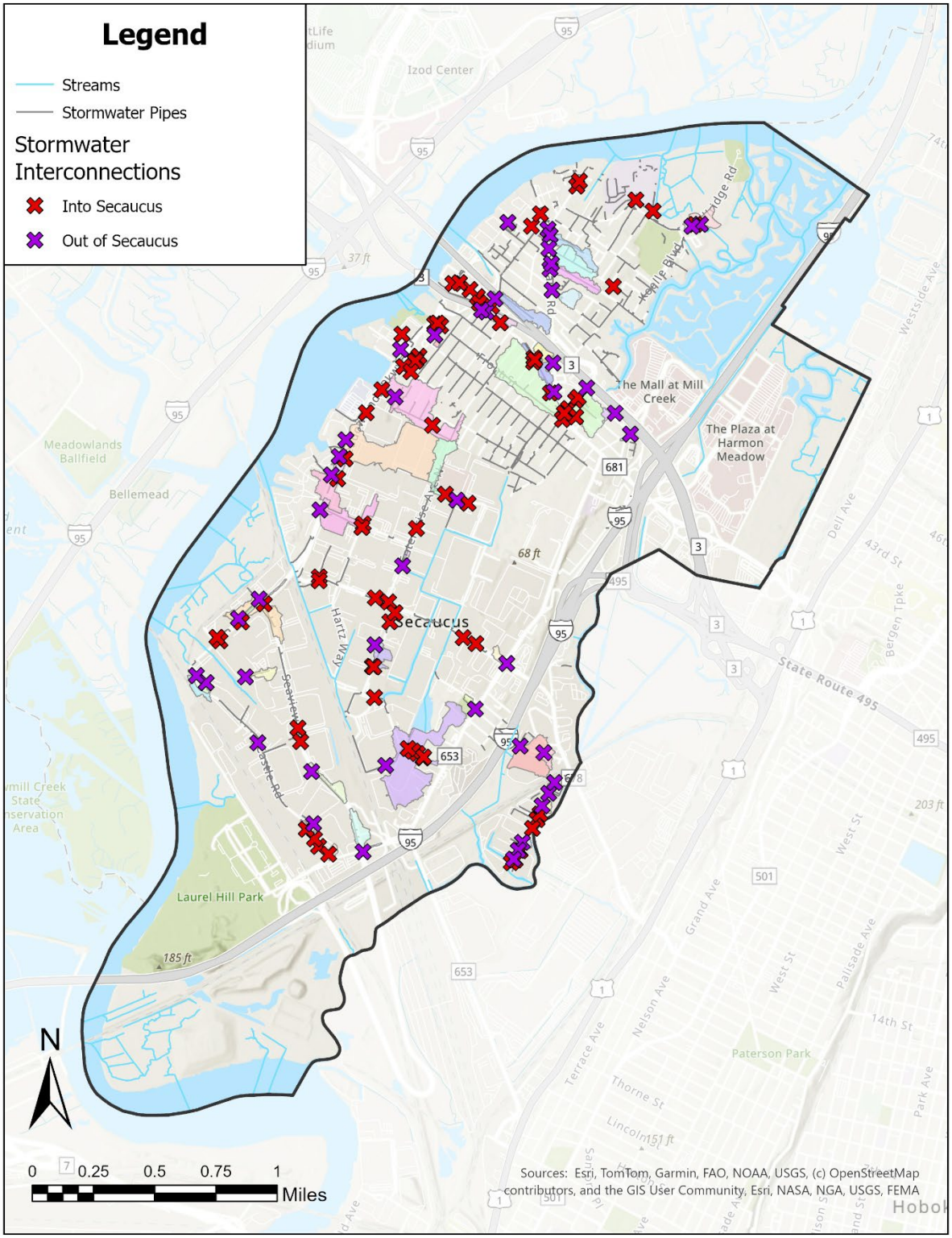

Figure 5: Town of Secaucus stormwater interconnection watersheds

TMDLs and Water Quality Impairments

Section 303(d) of the Clean Water Act requires states to identify and list waters that do not meet water quality standards after the implementation of technology-based controls. These waters are impaired, meaning they do not meet water quality standards designed to protect public health and the environment. If a water body is found to be impaired, it is included in the 303(d) list, and a total maximum daily load (TMDL) may be developed for that impairment. In accordance with Section 305(b) and 303(d) of the Federal Clean Water Act, New Jersey is required to assess the overall water quality of the state's waters and identify those waterbodies with a water quality impairment for which TMDLs may be necessary. NJDEP fulfills its assessment obligation under the Clean Water Act through the Integrated Water Quality Monitoring and Assessment Report, which includes the Integrated List of Waterbodies, issued biennially. A TMDL represents the assimilative or carrying capacity of a waterbody, taking into consideration point and nonpoint sources of pollutants of concern, the natural background, and surface water withdrawals. A TMDL can be thought of as a "budget" for the total amount of a pollutant that can enter a waterbody while still maintaining surface water quality standards. TMDLs have been developed for various pollutants in various waterbodies throughout the state. Tier A MS4 discharges are considered point sources under the Clean Water Act. For MS4 discharges, best management practices (BMPs) are generally considered the most appropriate form of effluent limitation when designed to satisfy technology-based requirements and to protect water quality.

The NJDEP has created a TMDL Look-Up Tool to find applicable TMDLs for each municipality. This tool can be found at https://www.nj.gov/dep/dwq/msrp-tmdl-rh.htm. Only TMDLs related to stormwater as a source are included based on NJ-WET's (New Jersey Watershed Evaluation Tool) inclusions, and the data is up to date as of August 17, 2026. The TMDL Look-Up Tool includes a TMDL for Nickel which is not included in NJ-WET, but is included for completeness. This TMDL has no nonpoint source component and thus no action is required by Secaucus to address the TMDL. This tool will be reviewed every year to determine if new TMDLs have been approved and adopted so they can be incorporated into the Stormwater Pollution Prevention Plan (SPPP). Table 4 below shows the approved TMDLs for the waterbodies in Secaucus along with impairments identified by the 303(d) list published in 2022. Figure 6 depicts the region to which each TMDL applies, and

Figure 7 depicts the areas to which each of these impairments apply as listed in the 303(d) list.

Table 4: TMDLs and Impairments for Subwatersheds within or bordering Town of Secaucus, Hudson County, NJ

HUC 14	Subwatershed Name	TMDL(s)	Impairment(s)
02030103180080	Hackensack R (Rt 3 to Bellmans Ck)	Streamsheds Pre-2008 Nickel	Benzo(a) pyrene (PAHs) PCBs in Fish Tissue
02030103180090	Hackensack R (Amtrak bridge to Rt 3)	Streamsheds Pre-2008 Nickel	Benzo(a) pyrene (PAHs) Dissolved Oxygen (DO) PCBs in Fish Tissue
02030103180100	Hackensack R (below Amtrak bridge)	Streamsheds Pre-2008 Nickel	Benzo(a) pyrene (PAHs) Dissolved Oxygen (DO) PCBs in Fish Tissue

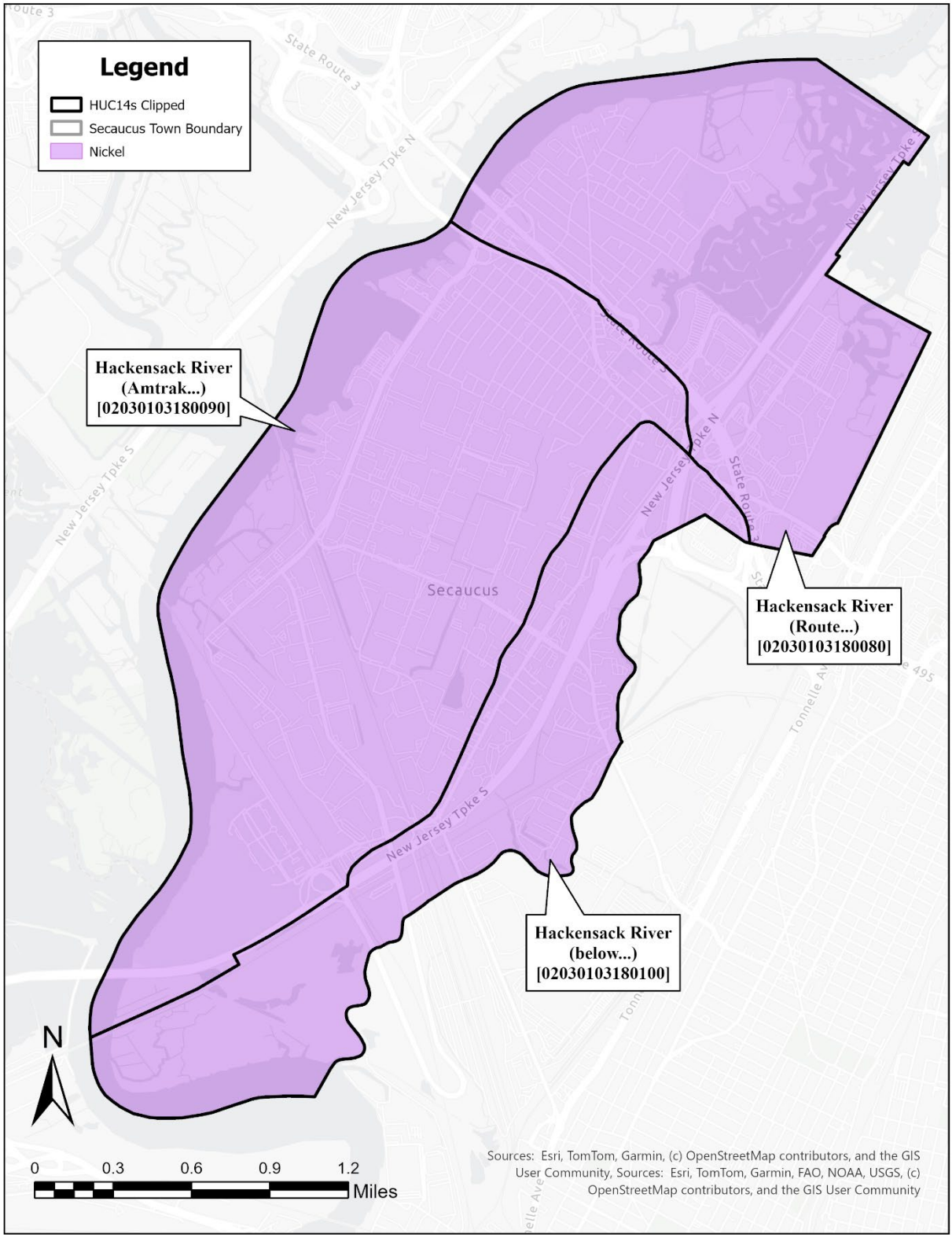

Figure 6: Town of Secaucus HUC14s with TMDLs (Nickel)

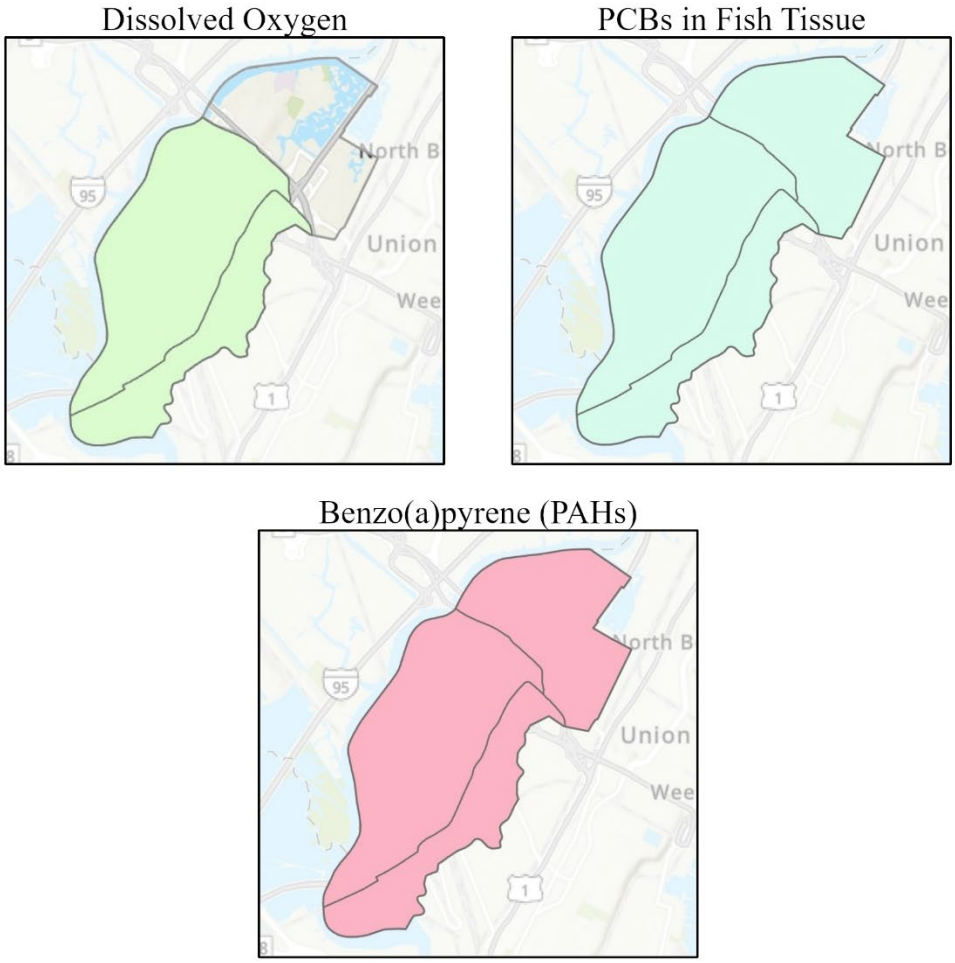

Figure 7: Town of Secaucus 303(d) impaired waters

Benzo(a)pyrene (PAHs) [Impairment]

"Benzo(a)pyrene is a member of a group of chemicals known as polycyclic aromatic hydrocarbons (PAHs) and which is a known hazardous substance that can cause cancer and other adverse health effects in humans. It is released into the air via both natural sources (such as forest fires) and anthropogenic sources including stoves and furnaces burning fossil fuels (especially wood and coal), crude oils, shale oils, coal tars, motor vehicle exhaust, cigarettes, and various industrial combustion processes (HSDB, 2012) (ATSDR, 1995). Several studies have reported that stormwater runoff into receiving waters from asphalt treated with coats of coal-tar emulsion seal could account for a large proportion of PAHs in many watersheds (Rowe and O'Connor, 2011; Van Metre and Mahler, 2010; Mahler et al., 2005). The major sources of nonoccupational exposure are ingestion of contaminated food and water, as well as tobacco products, and inhalation of polluted air" (NJDEP Pollutants of Concern, 2026).

Dissolved Oxygen [Impairment]

"Dissolved oxygen (DO) refers to the concentration of oxygen gas incorporated into the water. Oxygen enters the water by direct absorption from the atmosphere and is enhanced by turbulence. Running water, such as that of a swift moving stream, normally contains more dissolved oxygen than the still water of a pond or lake. Water also absorbs oxygen released by aquatic plants during photosynthesis. Sufficient DO is essential to growth and reproduction of aerobic aquatic life (e.g., see Murphy 2006, Giller and Malmqvist 1998, Allan 1995; https://www.epa.gov/caddis-vol2/dissolved-oxygen). Low levels of oxygen (hypoxia) or no oxygen levels (anoxia) can occur when excess organic materials are decomposed by microorganisms. During this decomposition process, the DO in the water is consumed. In some water bodies, DO levels fluctuate periodically, seasonally, and even as part of the natural daily ecology of the aquatic resource. As DO levels drop, some sensitive animals may move away, decline in health, or even die. DO is considered an important measure of water quality as it is a direct indicator of an aquatic resource's ability to support aquatic life. While each organism has its own DO tolerance range, generally, DO levels below 3 milligrams per liter (mg/L) are of concern and waters with levels below 1 mg/L are considered hypoxic and are usually devoid of life. Stormwater runoff containing nutrients such as nitrate, phosphorus, and organic TSS matter and animal and pet waste cause the levels of dissolved oxygen to decrease in the receiving waters. An increase in these materials transported via

stormwater runoff will have a greater impact on receiving waters" (NJDEP Pollutants of Concern, 2026).

PCB [Impairment]

"The term 'PCBs' (Polychlorinated Biphenyls) represents a broad class of toxic industrial chemicals first discovered and synthesized in the late 19th century. Their novel chemical properties led to widespread industrial production and usage peaking between the 1930's and late-1960's. Some products may continue to contain PCBs, including electrical equipment, motor and hydraulic oils, oil-based paint, and some plastics. The recognition of PCB associated health hazards were first noted in the 1960's and their production finally banned in 1979. PCBs can accumulate in the leaves and above-ground parts of plants and food crops. They are also taken up into the bodies of small organisms and fish. As a result, people who ingest fish may be exposed to PCBs that have bioaccumulated in the fish they are ingesting. Their oily nature allows them to accumulate in fatty animal tissues and bioaccumulate up the global food chain where they contribute to organ damage and carcinogenesis in higher-tiered species. PCBs are easily carried away as TSS by stormwater runoff from products containing the compounds which are exposed to stormwater and known and unknown contaminated areas. PCBs have a moderate level of volatility, which means that their vapors are also readily carried aloft by the wind. They are then deposited on exposed surfaces via air deposition" (NJDEP Pollutants of Concern, 2026).

Nickel [TMDL]

"Nickel is an abundant natural elemental metal and is necessary in many organism's diets but can become carcinogenic and toxic to health in high doses. Nickel is used in manufacturing, in combination with other metals, such as iron, copper, chromium, and zinc, to form many alloys used to make products such as stainless steel, vehicle brakes, fertilizers, ceramic paint, jewelry, kitchen ware, batteries, textiles, and coins. Nickel is transported into the receiving waters from various ground surfaces, including roadways and parking lots, when stormwater dissolves nickel from products. Stormwater also comes into contact with TSS containing particulates from these products, as well as through air deposition on the ground surface by vehicle exhaust, power plants, metal factories and waste incinerators, which is then transported to the receiving waters in the stormwater runoff. Stormwater runoff that travels through metal pipes may also pick up nickel

along the way to surface water bodies. High levels of nickel can cause harm to organisms, such as mammals, algae, fish, birds, and plants, impact drinking water, cause adverse effects on the overall quality of surface water, and can also pose a threat to soil health by stunting root growth resulting in ground erosion" (NJDEP Pollutants of Concern, 2026).

In April 2000, a TMDL was established for Nickel in the Hackensack River. The existing load from the Secaucus sewage treatment plant (STP) was 0.04 pounds per day at the time the TMDL was established. The TMDL set a waste load allocation/ load allocation of 0.06 pounds per day for this STP. The stormwater component of the load was set at 0.81 lbs/day to match existing loading and current water quality regulations should ensure this is maintained. The bulk of the TMDL reduction fell upon the Bergen County Utilities Authority. Therefore no action is needed by Secaucus to address this TMDL except ensuring the STP stays below its limit (NJDEP, 2000).

Impervious Cover

NJDEP's Open Data impervious surface GIS data layer based on the 2015 land use layer depicts surfaces throughout Secaucus that have been covered with materials that are highly resistant to infiltration by water, rendering them impervious (data collected August 17, 2026). These impervious cover values were used to estimate the impervious coverage for Secaucus. Based upon the NJDEP impervious surface data, Secaucus has impervious cover totaling 51.3%.

The literature suggests a link between impervious cover and stream ecosystem impairment (Schueler, 1994; Arnold and Gibbons, 1996; May et al., 1997). Impervious cover may be linked to the quality of lakes, reservoirs, estuaries, and aquifers (Caraco et al., 1998), and the amount of impervious cover in a watershed can be used to project the current and future quality of streams. Based on the scientific literature, Caraco et al. (1998) classified urbanizing streams into the following three categories: sensitive streams, impacted streams, and non-supporting streams.

Schueler (1994, 2004) developed an impervious cover model that classified "sensitive streams" as typically having a watershed impervious surface cover from 0-10%. "Impacted streams" have a watershed impervious cover ranging from 11-25% and typically show clear signs of degradation from urbanization. "Non-supporting streams" have a watershed impervious cover of greater than 25%; at this high level of impervious cover, streams are simply conduits for stormwater flow and no longer support a diverse stream community. Schueler et al. (2009) reformulated the impervious cover model based upon new research that had been conducted.

This analysis determined that stream degradation was first detected at 2 to 15% impervious cover. The updated impervious cover model recognizes the wide variability of stream degradation at impervious cover below 10%. The updated model also moves away from having a fixed line between stream quality classifications. For example, 5 to 10% impervious cover is included for the transition from sensitive to impacted, 20 to 25% impervious cover for the transition between impacted and non-supporting, and 60 to 70% impervious cover for the transition from non-supporting to urban drainage. Based upon this information, Secaucus's impervious cover percentage would suggest that its waterways are non-supporting, and most are contributing to the degradation of the state's surface water quality standards. The impervious cover broken down by

subwatershed can be seen in Table 5. The extent of the impervious cover in Secaucus is shown in Figure 8.

Table 5: Impervious Cover by HUC14

HUC14	Subwatershed Name	Area (Acres)	Impervious %
02030103180080	Hackensack R (Rt 3 to Bellmans Ck)	477.7	38.9%
02030103180090	Hackensack R (Amtrak bridge to Rt 3)	1,263.8	61.8%
02030103180100	Hackensack R (below Amtrak bridge)	411.3	44.6%
Total		**2,152.8**	**51.3%**

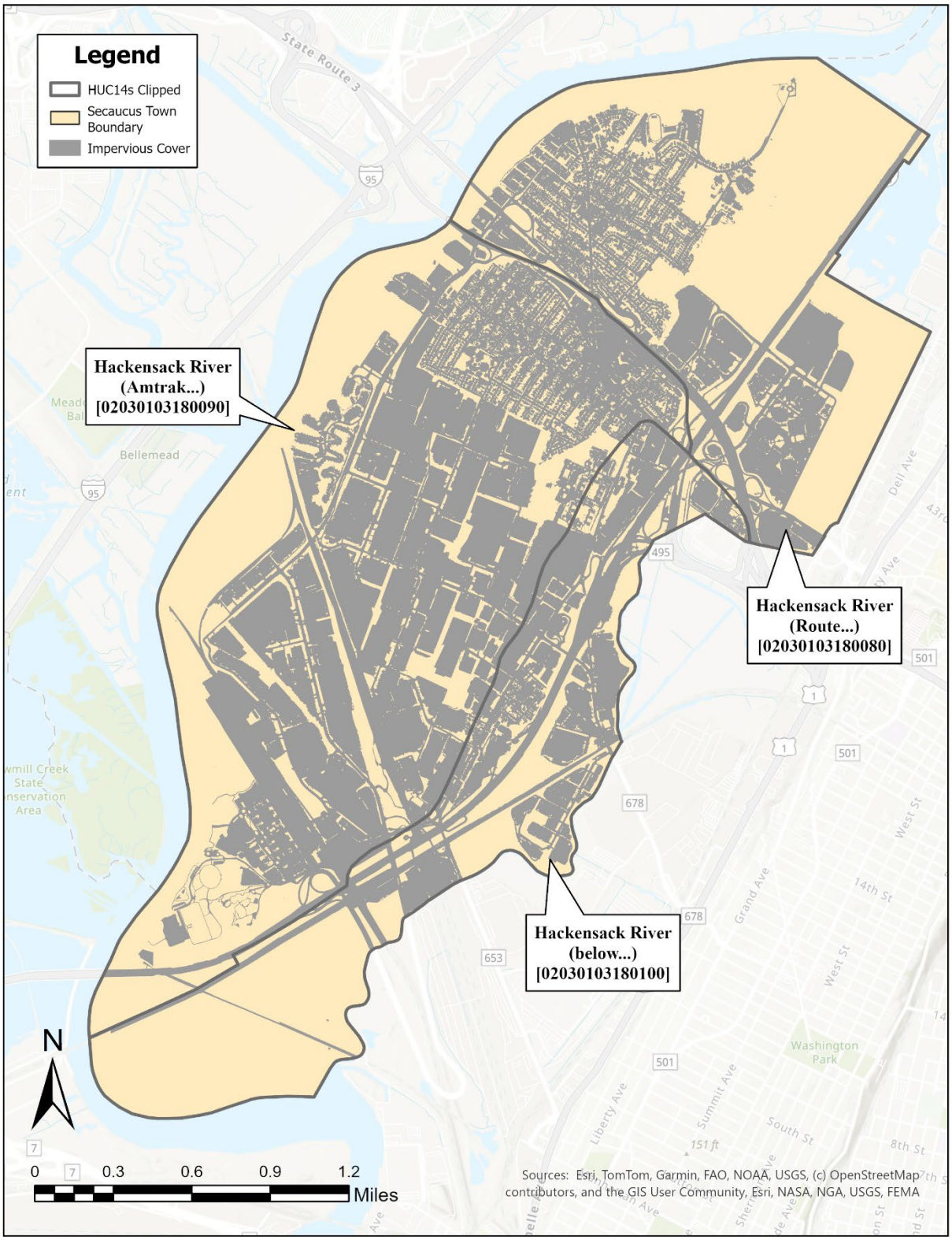

Figure 8: Town of Secaucus impervious cover

Overburdened Communities

Overburdened communities are areas with at least 35% low-income households, at least 40% minority race or tribal community, or at least 40% having limited English proficiency. These areas often are close to waterways and floodplain areas, but these communities tend to have limited financial resources and have less capacity to invest in adequate stormwater management systems, increasing the vulnerability of the community to flooding. Flooding in overburdened communities can also lead to public health issues since these communities are already more susceptible to health disparities. Additionally, these communities should have access to clean surface water for recreational actives especially since they may be less aware of potential dangers of swimming or fishing in polluted waterways. This dataset was extracted from NJDEP's GIS Open Data source in August 2026. The sections of Secaucus that are considered overburdened communities are depicted in Figure 9. Table 6 shows which subwatersheds contain overburdened communities.

Table 6: Subwatersheds with Overburdened Communities

HUC 14	Subwatershed Name	Present
02030103180080	Hackensack R (Rt 3 to Bellmans Ck)	X
02030103180090	Hackensack R (Amtrak bridge to Rt 3)	X
02030103180100	Hackensack R (below Amtrak bridge)	X

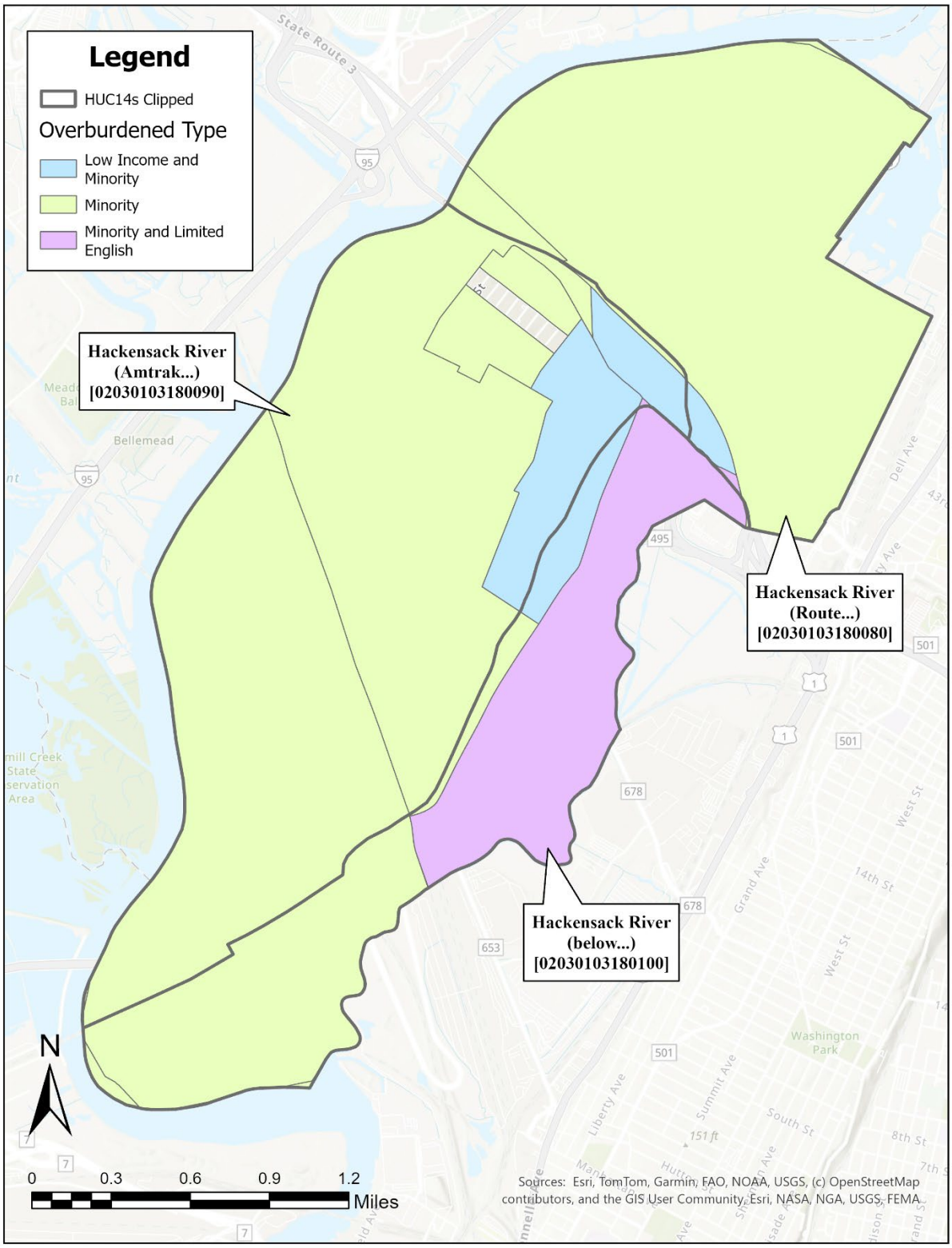

Figure 9: Town of Secaucus overburdened communities

Non-Municipally Owned and Operated Stormwater Infrastructure

Secaucus has collected data for non-municipally owned and operated stormwater infrastructure which consists of stormwater management basins (detention basins, dry wells, retention basins, and an infiltration basin) from existing records. The storm drain inlet layer contains all known storm drain inlets that are not owned or operated by the municipality. The outfall dataset also contains all known outfalls that exist within the municipality. Of the stormwater facilities (outfalls and catch basins excluded), there are seven owned by Secaucus and 95 owned by non-municipal entities. One of the stormwater facilities owned by a private entity is a groundwater discharge point. Every subwatershed has non-municipally owned or operated stormwater infrastructure (outfalls and/or stormwater facilities).

These stormwater facilities and the groundwater discharge point are displayed in Figure 10. Non-municipally owned outfalls are displayed in Figure 11. The attribute fields of the stormwater facilities, outfalls, and inlets contain the respective ownership information.

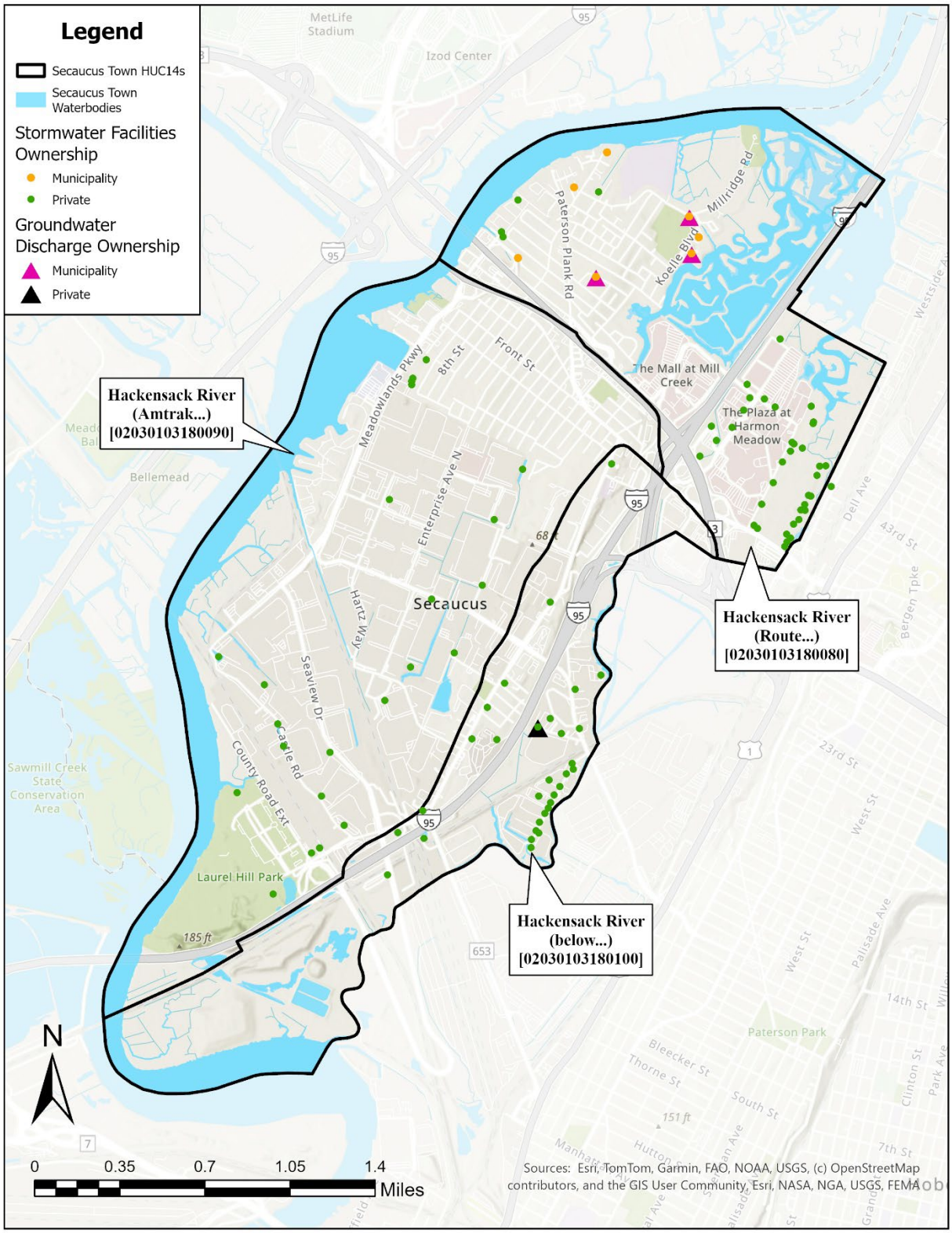

Figure 10: Stormwater facilities and groundwater discharge point (Town of Secaucus owned & other)

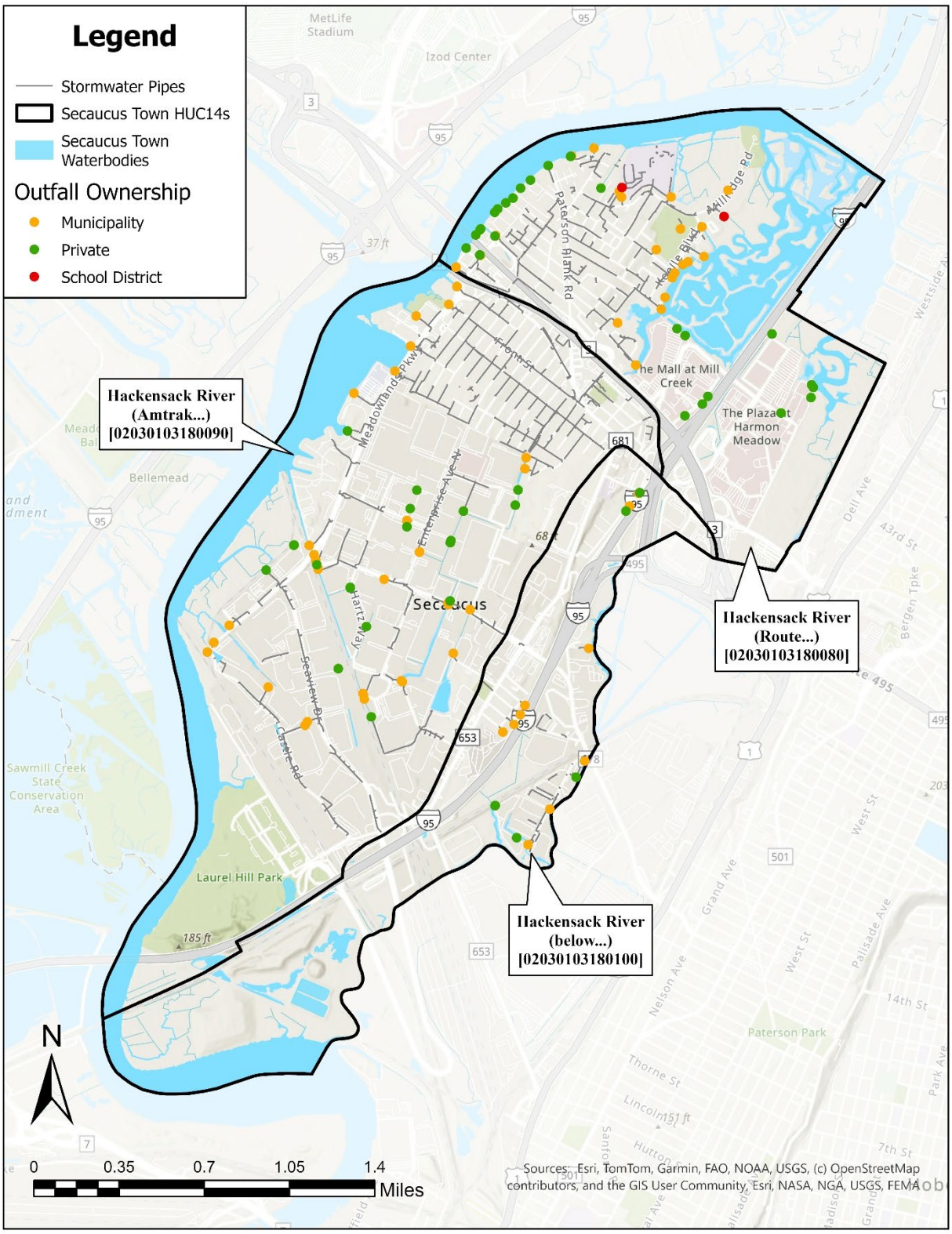

Figure 11: Outfalls (Town of Secaucus owned & other)

Conclusion

This Watershed Inventory Report shall serve as a record of the known stormwater infrastructure, water quality data, and additional relevant information. All the datasets contained in this report have been compiled into a GIS digital map that can be utilized to look at the data in far more detail than the static maps included will provide. This report will be followed by a Watershed Assessment Report, which will provide an assessment of potential water quality improvement projects that can be done to address water quality issues that have been identified in this report.

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